PATENT APPLICATION TRANSMITTAL LETTER
(Small Entity)

Docket No.
4297-104US

TO THE ASSISTANT COMMISSIONER FOR PATENTS

Transmitted herewith for filing under 35 U.S.C. 111 and 37 C.F.R. 1.53 is the patent application of:

Albert Santelli, Jr.

For: **PLASTIC EXTRUSION HAVING UNITARY THERMOPLASTIC RUBBER AND THERMOPLASTIC SECTIONS**

Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No. **EM045179410US**
- ☒ **TWO** sheets of drawings.
- ☐ A certified copy of a application.
- ☒ Declaration ☒ Signed. ☐ Unsigned.
- ☒ Power of Attorney
- ☐ Information Disclosure Statement
- ☐ Preliminary Amendment
- ☒ **ONE** Verified Statement(s) to Establish Small Entity Status Under 37 C.F.R. 1.9 and 1.27.
- ☒ Other: **RETURN POST CARD**

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra		Rate	Fee
Total Claims	10	- 20 =	0	x	$11.00	$0.00
Indep. Claims	1	- 3 =	0	x	$41.00	$0.00
Multiple Dependent Claims (check if applicable) ☐						$0.00
					BASIC FEE	$395.00
					TOTAL FILING FEE	$395.00

- ☒ A check in the amount of **$395.00** to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **13-2165** as described below. A duplicate copy of this sheet is enclosed.
  - ☐ Charge the amount of as filing fee.
  - ☒ Credit any overpayment.
  - ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
  - ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: **July 22, 1998**

Signature

Scott N. Bernstein, Esq.
Reg. No. 38,827
Mathews, Collins, Shepherd & Gould, P.A
100 Thanet Circle, Suite 306
Princeton, NJ 08540
Tel. (609) 924-8555
Fax (609) 924-3036

cc:

4297-104US

"EXPRESS MAIL CERTIFICATE"

"Express Mail" mailing label number: EM045179410US
Date of Deposit: July 22, 1998

I hereby certify that the following are being deposited with the United States Postal Service's "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to Assistant Commissioner for Patents, "Box Application", Washington, D.C. 20231:

1. Transmittal Letter;

2. Executed Declaration and Power of Attorney;

4. Executed Small Entity Statement;

5. Application consisting of 5 pages of specification, 2 pages of claims, 1 page of Abstract, and 2 pages of informal drawings;

6. Return Postcard, and

7. Check in the amount of $395.00.

Deborah M. Wilkinson

PLASTIC EXTRUSION HAVING UNITARY THERMOPLASTIC RUBBER AND THERMOPLASTIC SECTIONS

FIELD OF INVENTION

This invention relates to plastic extrusions, and in particular, to a plastic extrusion comprising a flexible section of thermoplastic rubber unitary with one or more rigid sections of thermoplastic.

BACKGROUND OF THE INVENTION

Plastic extrusions having flexible elements are used for making a variety of structures such as hinges or weather-stripping. Such extrusions typically comprise a thin flexible section adjoining two thicker, fairly rigid sections which may be fastened or affixed to other structures. The entire extrusion is commonly made from polypropylene material.

These extrusions, however, have been less than adequate when subjected to a large number of flexure cycles, especially in low temperature environments. This is because the thin flexible section usually fails by fatiguing or tearing away from one of the rigid sections.

An attempt has been made to address this flexure cycle problem in U.S. Patent No. 4,563,381. This patent discloses an extrusion comprising a flexible section made from a polyester elastomer extruded in tandem (coextruded) with at least one semi-rigid section of a thermoplastic material. During the coextrusion process, the end surfaces of the flexible section bond to surfaces of the rigid sections.

Unfortunately, the thin flexible section tends to peel away from the rigid sections when subjected to repeated flexing. Accordingly, there is still a need for an improved extrusion having a thin flexible section that is securely connected to one or more rigid sections.

SUMMARY OF THE INVENTION

An improved extrusion comprises a flexible section of thermoplastic rubber, a substantially rigid section of thermoplastic unitary with the flexible section at a juncture of the sections, and tongue and groove means for increasing the surface area of the juncture. The extrusion can further comprise at least a second substantially rigid section of thermoplastic unitary with the flexible section at a second juncture and a second tongue and groove means for increasing the surface area of the second juncture.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages, nature and various additional features of the invention will appear more fully upon consideration of the illustrative embodiments described in detail below, considered together with the accompanying drawings. In the drawings:

FIG. 1 is an elevational view of an extrusion according to the present invention;

FIG. 2 is an elevational view of a second type of extrusion according to the present invention;

FIGS. 3A-3D are elevational views of other types of extrusions made according to the present invention;

FIG. 4A is an elevational view of an extrusion configured as a folding panel;

FIG. 4B is an enlarged view of a section of the extrusion of FIG. 4A; and

FIG. 5 is an elevational view of an extrusion having a tapered tongue and groove arrangement.

It should be understood that the drawings are for purposes of illustrating the concepts of the invention and are not to scale.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a plastic extrusion 10 according to the present invention. The plastic extrusion 10 comprises an elongated flexible section 12 of thermoplastic rubber that is unitary with an elongated planar rigid section of thermoplastic 14. The unitary juncture of the two sections 12, 14 is configured in a tongue and groove arrangement 16. The tongue and groove arrangement 16 substantially increases the contact or bonding surface area at the juncture of the flexible and rigid sections 12, 14 thereby improving the shear strength of the bond therebetween. Moreover, the since the flexible section 12 is made from a flexible material, it does not have to be made thinner than the rigid section 14 in order to be flexible.

The extrusion 10 shown in FIG. 1 can be used as a weather strip. In this application the rigid section 14 can be used for attaching the extrusion to a first structure such as a door (not shown) and the flexible section 12 can be used as a seal against another structure such as a door jamb (not shown).

The extrusion 10 is made by coextruding the flexible and rigid sections 12, 14 from the same die (not shown). This involves introducing hot liquified thermoplastic rubber into the section of the die where the flexible section is formed at the same time that hot liquified plastic is introduced into the section of the die where the rigid section is formed. The tongue and groove

shaped juncture where the liquified rubber of the flexible section and the liquified plastic of the rigid section meet in the die bond together and becomes unitary when the sections are cooled as the extrusion is extruded from the die.

The tongue and groove arrangement 16 can take many forms. In FIG. 1, the arrangement 16 includes a tongue or projection 18 extending from the flexible section 12 and a corresponding groove 20 defined in the rigid section 14. FIG. 2 shows an extrusion 30 having a tongue and groove arrangement 36 that includes two tongues 38 extending from the bonding surface of the flexible section 32 and two corresponding grooves 40 defined in the bonding surface of the rigid section 34.

FIGS. 3A-3D show various types of extrusions 50, 60, 70, 80 embodying the principles of the present invention. These extrusions are especially useful as hinges. Each of the extrusions 50, 60, 70, 80 shown in FIGS. 3A-3D comprises an elongated flexible section 52, 62, 72, 82 of thermoplastic rubber that is unitary with two elongated planar rigid sections 54, 64, 74, 84 of plastic. The extrusions 50, 60 shown in FIGS. 3A and 3B have tongues 56, 66 extending from the flexible sections 52, 62 and grooves 58, 68 defined in the rigid sections 54, 64. The extrusions shown in FIGS. 3C and 3D have tongues 78, 88 on the rigid sections 74, 84 and grooves 76, 86 in the flexible sections 72, 82. Although not shown, combinations of tongues and grooves can be provided on each of the sections if desired.

The flexibility of the flexible section can be increased if desired by reducing the cross-sectional area thereof. For example, the extrusions shown in FIGS. 3A and 3B, have flexible

sections 52, 72 which have been made more flexible by providing tapers 59, 79 in the central regions thereof.

FIG. 4A shows an extrusion 90 configured as a folding panel. The extrusion 90 comprises a plurality of elongate flexible sections 92 of thermoplastic rubber and plurality of planar rigid sections 94 of thermoplastic. Each flexible section 92 has two rigid sections 94 extending from and unitary with a side thereof. Tongues 96 and grooves 98 are provided at the junctures of the sections 92, 94 as best seen in FIG. 4B.

The tongue and groove arrangement of the extrusion can also provide mechanical interlocking of the sections. FIG. 5 shows an extrusion 100 having a "dove-tail" tapered tongue and groove arrangement 102. Mechanical interlocking can also be provided with a T-shaped tongue and correspondingly shaped groove (not shown).

The thermoplastic rubber forming the flexible section of the extrusion can be neoprene and the thermoplastic forming the rigid section of the extrusion can be polyethylene. Other materials can also be used such as those described in U.S. Patent No. 4,563,381 which is incorporated herein by reference.

It will be understood that the embodiment described herein is merely exemplary and that a person skilled in the art may make many variations and modifications to the described embodiment utilizing functionally equivalent elements to those described. Any variations or modifications to the invention just described are intended to be included within the scope of the invention.

CLAIMS

What is claimed is:

1. An extrusion comprising;

a flexible section of thermoplastic rubber;

a substantially rigid section of thermoplastic unitary with the flexible section at a juncture of the sections; and

a tongue and groove means for increasing the surface area of the juncture.

2. The extrusion according to claim 1, wherein the tongue and groove means includes at least one tongue extending from the flexible section, the tongue received in a corresponding groove defined in the rigid section.

3. The extrusion according to claim 1, wherein the tongue and groove means includes at least one tongue extending from the rigid section, the tongue received in a corresponding groove defined in the flexible section.

4. The extrusion according to claim 1, further comprising at least a second substantially rigid section of thermoplastic unitary with the flexible section at a second juncture and a second tongue and groove means for increasing the surface area of the second juncture.

5. The extrusion according to claim 4, wherein the flexible section is disposed between the rigid sections.

6. The extrusion according to claim 5, wherein the extrusion comprises a hinge.

7. The extrusion according to claim 4, wherein the rigid sections extend from a side of the flexible member.

8. The extrusion according to claim 7, wherein the extrusion comprises a hinge.

9. The extrusion according to claim 4, wherein the rigid sections extends from opposite sides of the flexible member.

10. The extrusion according to claim 1, wherein the tongue and groove means includes at least one tongue extending from the flexible section, the tongue received in a corresponding groove defined in the rigid section and at least one tongue extending from the rigid section, the tongue extending from the rigid section received in a corresponding groove defined in the flexible section.

ABSTRACT OF THE DISCLOSURE

An improved extrusion having a flexible section of thermoplastic rubber, a substantially rigid section of thermoplastic unitary with the flexible section at a juncture of the sections, and tongue and groove means for increasing the surface area of the juncture. The extrusion can further have at least a second substantially rigid section of thermoplastic unitary with the flexible section at a second juncture and a second tongue and groove means for increasing the surface area of the second juncture.

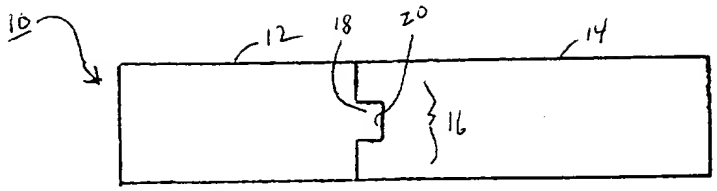

FIG. 1

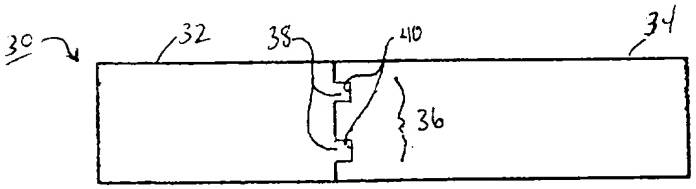

FIG. 2

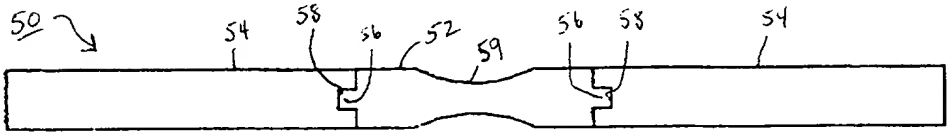

FIG. 3A

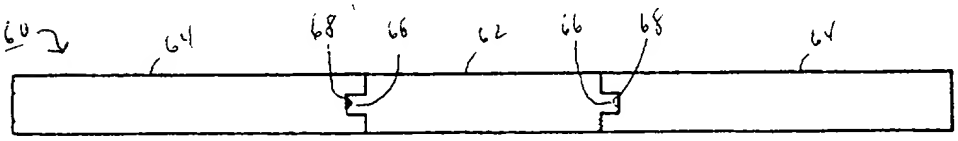

FIG. 3B

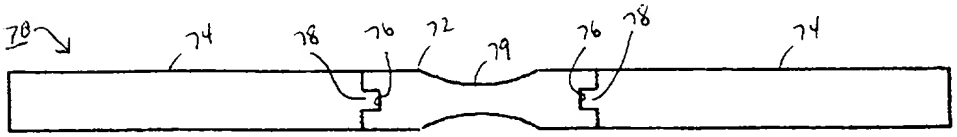

FIG. C

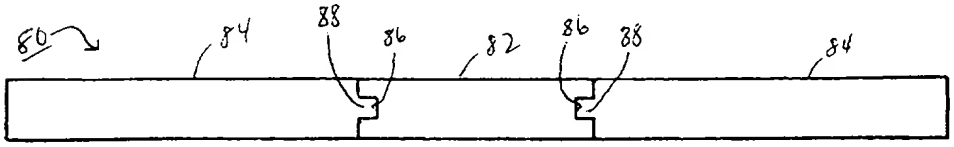

FIG. 3D

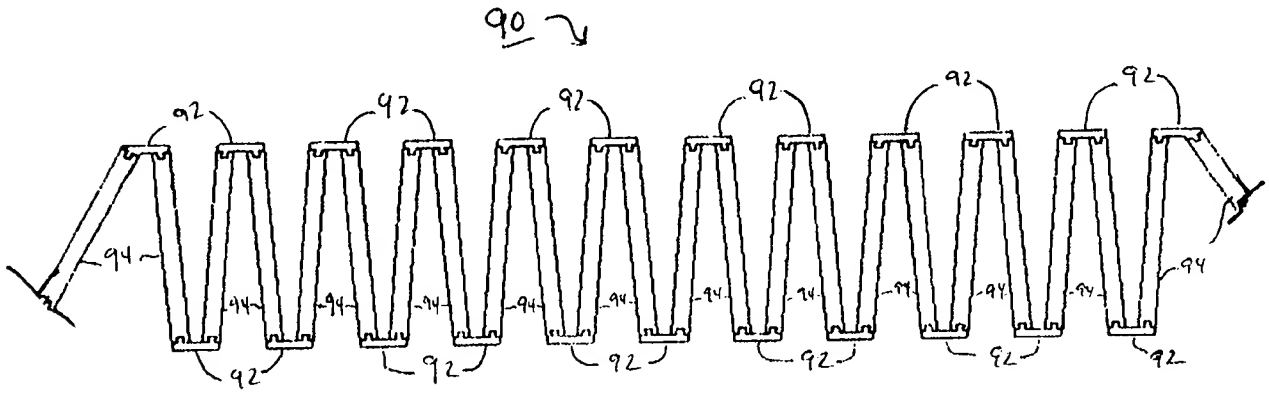

FIG. 4A

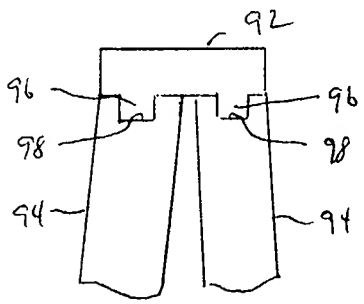

FIG. 4B

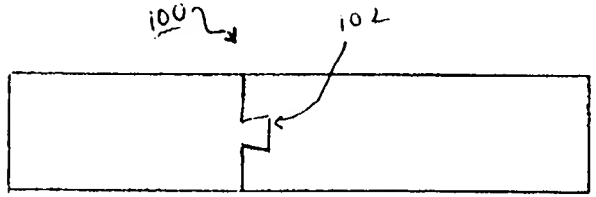

FIG. 5

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) AND 1.27 (b)) - INDEPENDENT INVENTOR	Docket No. 4297-104

Serial No.	Filing Date	Patent No.	Issue Date
herewith	herewith		

Applicant/ Patentee: **Albert Santelli, Jr.**

Invention:

PLASTIC EXTRUSION HAVING UNITARY THERMOPLASTIC RUBBER AND THERMOPLASTIC SECTIONS

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled above and described in:

- ☒ the specification to be filed herewith.
- ☐ the application identified above.
- ☐ the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ No such person, concern or organization exists.
- ☐ Each such person, concern or organization is listed below.

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

FULL NAME _____

ADDRESS _____

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME _____

ADDRESS _____

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME _____

ADDRESS _____

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME _____

ADDRESS _____

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF INVENTOR **Albert Santelli, Jr.**
SIGNATURE OF INVENTOR A Santelli DATE: 7/20/98

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

NAME OF INVENTOR ______
SIGNATURE OF INVENTOR ______ DATE: ______

Docket No.
4297-104

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

PLASTIC EXTRUSION HAVING UNITARY THERMOPLASTIC RUBBER AND THERMOPLASTIC SECTIONS

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed
(Number)	(Country)	(Day/Month/Year Filed)	☐
(Number)	(Country)	(Day/Month/Year Filed)	☐
(Number)	(Country)	(Day/Month/Year Filed)	☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Bruce M. Collins	**Reg. No. 20,066**	**all of the firm:**
Scott N. Bernstein	**Reg. No. 38,827**	
Glen E. Books	**Reg. No. 24,950**	**Mathews, Collins, Shepherd & Gould, P.A.**
Diane Dunn McKay	**Reg. No. 34,586**	**100 Thanet Circle, Suite 306**
Ronald Gould	**Reg. No. 28,299**	**Princeton, NJ 08540**
Anastasia P. Winslow	**Reg. No. 40,875**	
Paul A. Schwarz	**Reg. No. 37,577**	**Tel: (609) 924-8555**
		Fax: (609) 924-3036

Send Correspondence to: **Paul A. Schwarz, Esq.**
Mathews, Collins, Shepherd & Gould, P.A.
100 Thanet Circle, Suite 306
Princeton, New Jersey 08540

Direct Telephone Calls to: *(name and telephone number)*
Paul A. Schwarz Tel. (609) 924-8555 FAX (609) 924-3036

Full name of sole or first inventor **Albert Santelli, Jr.**	
Sole or first inventor's signature ASJr	Date 7/20/98
Residence **Bound Brook, New Jersey**	
Citizenship **United States**	
Post Office Address **123 North Mountain Avenue**	
Bound Brook, New Jersey 08805	

Full name of second inventor, if any	
Second inventor's signature	Date
Residence	
Citizenship	
Post Office Address	